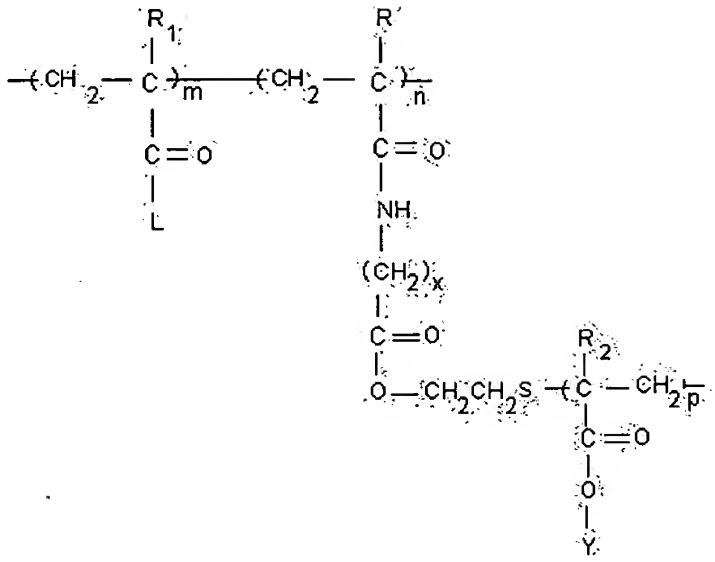
Claims

1. Copolymers having formula (1)



Formula (1)

wherein,

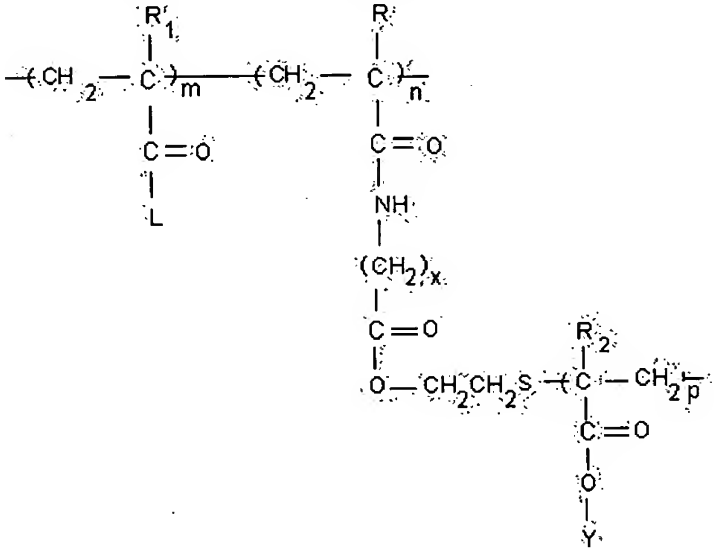
R is H, CH_3, C_2H_5, C_6H_5; R_1 is H, CH_3, C_2H_5, C_6H_5; R_2 is H, CH_3, C_2H_5, C_6H_5;

X is between 4-10; m is from 3 to 500; n is from 2 to 50; p is form 2 to 50; L is OH, NH_2, OCH_3 , $NHCH(CH_3)_2$; and

Y is *N*-Acetyl Glucosamine (NAG), mannose, galactose, sialic acid, fructose, ribulose, erythrolose, xylulose, psicose, sorbose, tagatose, glucopyranose, fructofuranose, deoxyribose, galactosamine, sucrose, lactose, isomaltose, maltose, cellobiose, cellulose and amylose.

2. A copolymer as claimed in claim 1, wherein the molecular weight of the copolymers is in the range of 1,000 to 2,00,000 daltons.
3. A copolymer as claimed in claim 1, wherein the ratio of polymerizable monomer to polymeric macromer is in the range of 2:98 to 98:2.
4. A copolymer as claimed in claim 1, wherein the copolymers containing the ligand are useful for applications in medicine and biotechnology.
5. A copolymer as claimed in claim 1, wherein the copolymers are more stable for interactions with bio-molecules.
6. A copolymer as claimed in claim 1, wherein the macropolymer polyvalent form are more efficient than NAG alone in enzyme inhibition.

7. A copolymer as claimed in claim 1, wherein the binding constant (K_b) for copolymers of NIPA and Ac. NAG is in the range of 1.97×10^5 to 2.47×10^5
8. A copolymer as claimed in claim 6, wherein the copolymers along with NAG enhance the K_b by 2556 folds than the NAG alone.
9. A copolymer as claimed in claim 1, wherein the copolymers reduce the lysozyme inhibition (I_{50}) by about 28500 folds.
10. A copolymer as claimed in claim 1, wherein the binding (I_{max}) of copolymers is enhance in the range of about 69 to 95.
11. A copolymer as claimed in claim 1, wherein the copolymers containing the ligands are synthesized by free radical polymerization.
12. A copolymer as claimed in claim 1, wherein the copolymers provide a greater accessibility to the ligand conjugate for binding with receptor bio-molecule
13. A copolymer as claimed in claim 1, wherein the copolymers containing ligands bind simultaneously on the multiple sites of the enzymes/disease causing viruses thereby enhancing the inhibitory effect.
14. A copolymer as claimed in claim 1, wherein the copolymers ligands are stable, water stable, resistant to degradation, and free from microbial contamination, which is an advantage over the natural polymers such as chitin and chitosan.
15. A process of preparing copolymers of formula 1,



Formula (1)

wherein,

R is H, CH_3, C_2H_5, C_6H_5; R_1 is H, CH_3, C_2H_5, C_6H_5; R_2 is H, CH_3, C_2H_5, C_6H_5;

X is between 4-10; m is from 3 to 500; n is from 2 to 50; p is form 2 to 50; L is OH, NH_2 ,OCH_3 , $NHCH(CH_3)_2$; and

Y is *N*-Acetyl Glucosamine (NAG), mannose, galactose, sialic acid, fructose, ribulose, erythrolose, xylulose, psicose, sorbose, tagatose, glucopyranose, fructofuranose, deoxyribose, galactosamine, sucrose, lactose, isomaltose, maltose, cellobiose, cellulose and amylose, said process comprising steps of:

(a) dissolving a polymerizable macromer in a solvent followed by strirring to obtain a clear reaction mixture,

(b) purging nitrogen in the reaction mixture in the range of 10 minutes to about 45 minutes,

(c) adding the reaction mixture of step (b) to an initiator containing an accelerator,

(d) allowing the reaction mixture of step (c) to copolymerize for about 2 to 13 hrs at a temperature in the range of about 25°C to 65°C,

(e) precipitating the copolymer of step (d) by adding a solvent, and if desired,

(f) drying the precipitated copolymer of step (e) by vacuum at room temperature to obtain the copolymer

16. A process as claimed in claim 15, wherein the polymerizable monomer in the step (a) is selected from a group comprising of acrylic acid, methacrylic acid, methacryloyl chloride, acrylamide, *N*-isopropyl acrylamide (NIPA), 2-acrlamido-2-methylpropanesulphonic acid (AMPS) methacrylate, acryloyl chloride, acryloyl morpholine, vinylpyrrolidone or styrene.

17. A process as claimed in claim 15, wherein the solvent in the step (a) is selected from a group comprising of water, methanol, ethanol or isobutyl alcohol.

18. A process as claimed in claim 15, wherein the purging the nitrogen in the reaction mixture in the step (b) to about 30 minutes

19. A process as claimed in claim 15, wherein the initiator in the step (c) is selected from a group comprising of Ammonium Per Sulphate (APS), Potassium Per Sulphate (KPS), or Azobis Iso Butyro Nitril (AIBN).

20. A process as claimed in claim 15, wherein the accelerator in the step (c) is N,N,N',N'; Tetramethyl Ethylene Diamine (TEMED).

21. A process as claimed in claim 15, wherein the copolymerization in the step (d) is carried out at temperature in the range of about 30 to 60 ^{O} C.

22. A process as claimed in claim 15, wherein the solvent in the step (e) is selected from group comprising of diethyl ether, acetone, hexane or hot water.

23. A process as claimed in claim 15, wherein the molecular weight of the copolymers is in the range of 1,000 to 2,00,000 daltons.

24. A process as claimed in claim 15, wherein the ratio of polymerizable monomer to polymeric macromer is in the range of 2:98 to 98:2.

25. A process as claimed in claim 15, wherein the copolymers containing the ligand are useful for applications in medicine and biotechnology.

26. A process as claimed in claim 15, wherein the copolymers are more stable for interactions with bio-molecules.

27. A process as claimed in claim 15, wherein the macropolymer polyvalent form are more efficient than NAG alone in enzyme inhibition.

28. A process as claimed in claim 15, wherein the binding constant (K_b) for copolymers of NIPA and Ac. NAG is in the range of 1.97×10^5 to 2.47×10^5

29. A process as claimed in claim 28, wherein the copolymers along with NAG enhance the K_b by 2556 folds than the NAG alone.

30. A process as claimed in claim 15, wherein the copolymers reduce the lysozyme inhibition (I_{50}) by about 28500 folds.

31. A process as claimed in claim 15, wherein the binding (I_{max}) of copolymers is enhance in the range of about 69 to 95.

32. A process as claimed in claim 15, wherein the copolymers containg the ligands are synthesized by free radical polymerization.

33. A process as claimed in claim 15, wherein the copolymers provide a greater accessibility to the ligand conjugate for binding with receptor bio-molecule

34. A process as claimed in claim 15, wherein the copolymers containg ligands bind simultaneously on the multiple sites of the enzymes/disease causing viruses thereby enhancing the inhibitory effect.

35. A process as claimed in claim 15, wherein the copolymers ligands are stable, water stable, resistant to degradation, and free from microbial contamination, which is an advantage over the natural polymers such as chitin and chitosan.